

Course Title: Telecommunication Networks
Date: 12/1/ 2011 (First term)

Course Code: EEC 4124
Allowed time: 3 hrs

Year: 4th
No. of Pages: (2)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches)

Problem number (1)

- (A) What are the main objectives of the telecommunication?
- (B) Compare between LAN, WAN, and MAN in terms of coverage area, transmission rate, ownership, and application.
- (C) Discuss the effect of different transmission paths on the wave propagation.
- (D) There are many problems encountered with the transmission of a signal through transmission media. State, briefly in points, these problems, their sources, effects and methods to overcome each one.

Problem number (2)

- (A) What are the functions of signaling system?
- (B) Compare between In-Channel and Common Channel Signaling.
- (C) What are the advantages and disadvantages of CCS?
- (D) What are the operation modes of CCS?

Problem number (3)

- (A) Compare between datagram and virtual circuit packet switching. In your comparison refer to the following factors:

- i- Circuit setup time
- ii- Propagation and processing delays
- iii- Packet transmission time
- iv- Packet size
- v- Delay caused by waiting for the packet to arrive at each intermediate station.

- (B) It is required to transfer a message with size of 80 Kbytes over a communication network with 3 nodes, from the user to the server. The data rate for all links is 2 Mbps. The packet size is 1000 bits and 100 bits as a header. The set-up time is 0.12 sec, with processing time of 0.08 sec at each node, while the average queuing delay at each node is 0.2 sec. The propagation speed over a link is $300 \text{ m}/\mu\text{sec}$, where the hop distance is 60 km. Calculate the end-to-end delay time for the following:

- i- Circuit switching network
- ii- Datagram packet switching network
- iii- Virtual circuit packet switching network with acknowledgment, $P_{\min} = 70 \text{ bits}$.

Problem number (4)

(A) Define the following terms: Arrival call rate, departure rate, busy hour, inter-arrival time, Grade of Service, Time Congestion, and Call Congestion.

(B) Discuss the following statement "The steady state condition for traffic is achieved under statistical equilibrium".

(C) Consider a single channel delay system M/M/1. Deduce an expression for the following parameters: delay probability, average number of customers in the system, delayed traffic and probability of finding j call trials in the queue.

(D) Consider a single channel packet network works as a delay system. In a busy hour, 1800 packets are offered, each of 1.2 sec duration. Calculate

- i. The probability that a packet is delayed
- ii. The average number of packets in the network
- iii. The average time spent in the network
- iv. The probability that there are more than 5 users in the system
- v. The average number of waiting packets
- vi. The probability that there are less than 6 packets in the network

Problem number (5)

(A) Discuss in points the main constraints to be considered when you are going to develop a numbering plan.

(B) Consider a user in UK has phoned his friend. He dialed the following number "003321327579"

- i. Is this a national or international call?
- ii. Does this number satisfy the CCITT recommendations? Discuss some of these with application on the dialed number
- iii. Classify the number to its basic elements

Best Wishes of Success

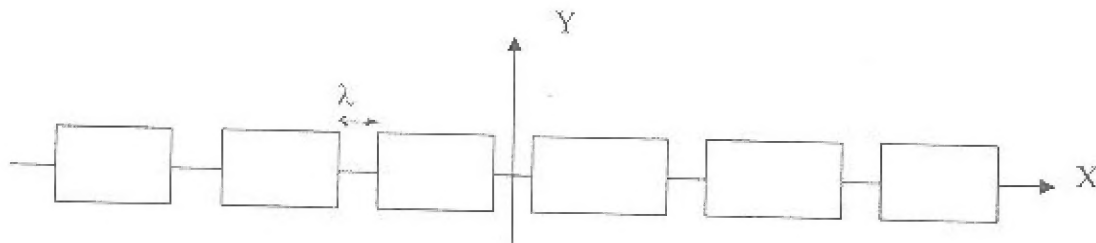
Page: 2/2

4- a- If a uniformly illuminated circular aperture with directivity 23.922 dBs with the H- field in Y- direction:

- Estimate the radius and the 3-dB beam width of the aperture.
- Find and sketch the total field pattern in both E and H planes.

b- The shown arrangement represents a broadside array that consists of 6 ($5\lambda \times 3\lambda$) rectangular apertures fed with the dominant mode :

- Find and sketch the field pattern of one aperture in both E and H planes
- Find and sketch the total field pattern in both E and H planes.
- Estimate the beam width and the gain of each element and those of the array.



c- (1) Discuss the main applications of the parabolic reflector antenna .then derive the relation between the $\frac{F}{d}$ ratio and the reflector subtended angle θ_0 .

(2) For the special case of feeding pattern on the form $G_f(\theta') = k \cos^2(\theta')$, derive an expression for the illumination efficiency η_{ill} and sketch it versus the reflector subtended angle θ_0

(3) Design the previous parabolic reflector antenna when having maximum directivity of 30 dBs at 6 GHz

" ربيع اشرف لي صديقي ويسر لي امري "
Dr. Abdel-Fattah A. Abu-Hashem



2010
2011

Electronics and Electrical Comm. Dept.
Total Marks: 85 Marks



Elective Course (3): Information Security
Date: Jan, 17th 2010 (First Term)

Course Code: EEC4126
Allowed Time: 3 hrs

Year: 4th
No. of Pages: (2)

Answer the following Questions:

Question.1 (18 Marks)

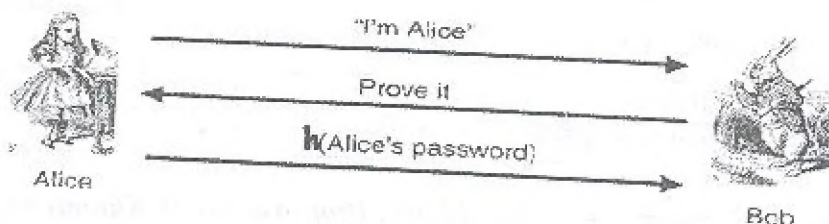
- Decrypt the following cipher: BSWSEETIHS if it was encrypted using Rail Fence Cipher with depth of 2. (3 Marks)
- Encrypt the word: SECURITY using a cipher that replaces each character with position a where (A has $a=0$, B has $a=1$, ... etc.) by another character with position $f(a)=(a*k)\bmod n$ (use $k=9$ and $n=26$). What is the type of this cipher? (5 Marks)
- Explain, briefly using diagrams, how the Output feedback (OFB) mode is used for encryption and decryption for symmetric block ciphers. What are the characteristics of this mode? (4 Marks)
- What is meant by *denial of service* and *interception* attacks? Are they active or passive attacks? Give one example for each. (Tabulate your answer) (6 Marks)

Question.2 (18 Marks)

- Consider the Diffie-Hellman key exchange protocol. Assume now that Oscar runs an active man-in-the-middle attack against the key exchange. For the Diffie-Hellman key exchange, use the parameters $p = 29$, $g = 2$, and $x = 10$, $y = 6$ for Alice and Bob, respectively. Oscar uses the value $z = 5$. Compute the key pairs K_{AO} and K_{BO} indicating: (9 Marks)
 - The formulas with which Oscar computes them.
 - The formulas with which Alice and Bob compute them.
 - What is the solution to this attack?
- What do you know, briefly, about the meaning of X.509 protocol, Realms Kerberos, PKI? (6 Marks)
- What is the HMAC? And what is its advantage? (3 Marks)

Question.3 (14 Marks)

- Why is it a good idea to hash passwords that are stored in a file? What is a "salt" and why should a salt be used whenever passwords are hashed? (6 Marks)
- The following figure shows a simple protocol to authenticate Alice using simple hashing. This protocol is subject to an attack from Trudy. What is the type of this attack? State two ways normally used to overcome it. Modify this protocol to overcome it. (5 Marks)



P.T.O



- c) Suppose that Alice signs the message $M = \text{"I am sorry"}$ and then encrypts it with Bob's public key before sending it to Bob. Bob can decrypt this to obtain the signed message and then encrypt the signed message with Charlie's public key and forward the resulting ciphertext to Charlie. Can Alice prevent this attack by using symmetric key cryptography instead of asymmetric encryption? Why? (3 Marks)

Question.4 (18 Marks)

- a) The following table indicates an example for AH contents (the width is 32 bits, i.e. 1 word): (6 Marks)
- What is the IPSec mode, transport or tunnel? Why?
 - What is the transport layer data protocol?
 - What do the numbers 10, 2000 mean?
 - What is the length of authentication data in words?

Next Header (6)	Payload length (15)	Reserved
Security Parameter index (10)		
Sequence Number (2000)		
Authentication data		

- b) The AH doesn't include the TTL (time to live) field of the IP header in the hashing process, why? And why we still need AH although the ESP is designed after it. (4 Marks)
- c) The following sentence is an example for a cipher suite for SSL, What information it contains? SSL_DH_WITH_NULL_MD5 (3 Marks)
- d) In what layer does the SSL protocol work? And state the SSL security services. (5 Marks)

Question.5 (17 Marks)

- a) In PGP protocol, the security parameters must be sent in one step with the message itself! Why? Also, explain how PGP overcomes this problem such that only the recipient will get the message and the security parameters. (6 Marks)
- b) State four methods used to provide security to the LAN. (4 Marks)
- c) What is the proxy firewall? And what are its benefits? (4 Marks)
- d) A router contains the following filtering table information, what do they mean? (3 Marks)

Interface	Source IP	Source port	Destination IP	Destination port
1 (Internet)	*	*	10.5.0.3	23
2 (Internal Network)	*	*	*	80

Tanta
University

Dept.: Elect. & electrical communications
Total Mark: 125 Marks

Faculty of
Engineering

Course Title: Mobile communications system

Course Code: EEC

Year: Fourth

Date: 22/ 1 /2011

Time Allowed: 3 Hours

No. of Pages:1

Remarks: (Answer the following questions...assume any missing data...answers should be supported by sketches)

Problem number (1)

20 Marks

- a- Define the following: Apogee, Perigee, line of apsides, inclination angle, retrograde satellites?
- b- Describe with sketches the following types of orbits: polar orbit, Molniya orbit and medium-earth orbit?

Problem number (2)

20 Marks

- a- A LEO satellite is in a circular orbit 250 km above the earth. Assume the average earth radius is 6378 km and the earth eccentricity is 0.

- 1- Determine the orbital velocity of the satellite in m/s?
- 2- What is the orbital period in minutes for a LEO satellite?
- 3- Determine the orbital angular velocity for the satellite in rad/sec?

- b- Determine the range, elevation and azimuth angle for the Nilesat 201 located at (7° W) received by a ground station located at (20° E) and (32° N) at an altitude of 2300 m?

Problem number (3)

20 Marks

- a- Compare between the spin and body stabilized satellites?
- b- Discuss in details the On-board processing satellite?

Problem number (4)

40 Marks

Write only the missing word:

-1..... are placed around electronic subsystems particularly for spin-stabilized satellites to protect critical equipments.
- Tracking refers to the determination of the current2.....,3....., and4..... of the spacecraft.
- 3- The elements in the TTC&M station includes4.....,5.....,6.....,7.....,8....., and9.....
-10..... are used to relocate the heat from power devices to outer walls or heat sinks.

Problem number (5)

25 Marks

- a- Explain what is meant by input and output backoff, saturation flux density and intermodulation noise?
- b- A satellite circuit has the following parameters:

	Uplink dB	Downlink dB
[EIRP]	60	40
[G/T]	0	20
[FSL]	190	195
[RFL]	2	2
[AA]	1	0.5
[AML]	0.6	0.7

Calculate the uplink, downlink and overall C/No value?

بسم الله الرحمن الرحيم
التاريخ: ٢٠١١/١/٢٦
الزمن : ساعتان

المادة/ إدارة المشروعات
(EEC31H4)
الفرقة الرابعة (اتصالات)

جامعة طنطا
كلية الهندسة
قسم هندسة الإنتاج والتصميم الميكانيكي

أجب عن الأسئلة الآتية :- (٤٠ درجة)

السؤال الأول :-

- ١- ما هو المشروع ؟ - اكتب نبذة مختصرة عن المراحل التي يمر بها المشروع المقترح للاستثمار.
- ٢- الجدوى الفنية هي إحدى مكونات دراسة الجدوى الاقتصادية - تكلم باختصار عن الجدوى الفنية.
- ٣- تكلم بالتفصيل عن عناصر التصنيع.

السؤال الثاني :-

- ١- ما المخزون ؟ - لماذا نحفظ بالمخزون.
- ٢- ما هي العوامل التي يترتب عليها نقصان أو زيادة العرض ؟
- ٣- لماذا نقوم باعداد دراسات جدوى الاقتصادية ؟ مع شرح تفصيلي لأنواع دراسات الجدوى الاقتصادية.

السؤال الثالث :-

- ١- ما أهمية المفاضلة بين المشروعات مع شرح لمرحلة المفاضلة بين المشروعات.
- ٢- اذكر اسس ومبادئ عملية تقييم المشروعات.
- ٣- اذكر أهم نقاط الاختلاف بين معايير الربحية التجارية ومعايير الربحية القومية.

السؤال الرابع :-

- ١- تكلم بالتفصيل عن أهم البيانات الثانوية اللازمة لإجراء دراسة الجدوى التسويقية.
- ٢- تكلم بالتفصيل عن البيئة التسويقية.
- اكتب نبذة مختصرة عن التقرير الخاص بك.

مع أطيب التمنيات بالنجاح
د. عبد الفتاح مصطفى خورشيد



Course Title : Wave Propagation and Antennas 2

Course Code : EEC412

Year : 4th

Date : January 15th (Academic Year 2010/2011 First Term)

Allowed time: 3 hrs

No: of pages :2

Attempt all questions:

1- a- Write down **short notes** about:

- i- The main antenna parameters.
- ii- Advantages of aperture antennas over wire antennas.
- iii- Objectives achieved by the antenna arrays.

b- Write down an expression for the array factor of a linear uniform array consisting of N elements. For a large **Broadside array**, derive the needed condition to avoid the presence of grating lobes and the limiting value of the peak-side lobe to main lobe ratio as N increases to a very large value. Estimate the array directivity and beam width considering isotropic elements.

c- Design an **Broadside array** such that no grating lobes exist in the resultant pattern and the peak-side lobe to main lobe ratio is less than **-12.4 dB** with minimum number of elements and maximum spacing. Plot the corresponding array factor and approximately estimate the beam width. If the array is along the X-axis and the elements are short dipoles oriented to Z-direction. Plot the resultant pattern in the X-Y and Y-Z planes. Estimate the directivity of the

2- a- Write down an expression for the array factor of the **non-uniform linear array** with symmetric feeding in the case of **even number of elements**.

b- For a **9 elements Binomial Endfire array** consisting of short dipoles placed on Z-axis that oriented towards the Y-axis and separated by $\lambda/2$ spacing:

- i- Estimate the elements relative feeding coefficients
- ii- Plot the array factor as well as the total field pattern in the Z-X and Y-X planes

c- For a **5 elements Broadside Tcheby-chave array** having **-10 dB SLL** and the elements are short dipoles placed on Y-axis that oriented towards the X-axis with $\lambda/2$ spacing:

- i- Obtain the elements relative feeding coefficients
- ii- Plot the array factor as well as the total field pattern in the Z-X and Y-X planes.

c- For a **6x4 elements** (short dipoles oriented to Z-axis) **planar array** placed in the x-y plane with $d_x = d_y = \lambda/2$ and having the main lobe oriented towards $(\theta_0 = 30^\circ \text{ and } \phi_0 = 90^\circ)$

Plot the array factor as well as the total field pattern in the Z-X , Z-Y and Y-X planes, then estimate the array gain in the x-y plane.

3- a- (1) Write down an expression for the array factor of a **circular array** placed in the X-Y plane, then, Estimate the **8 elements** phases(α_n) required to orient the main lobe to

$(\theta_0 = 30^\circ \text{ and } \phi_0 = 60^\circ)$ if the radius of the array is 4λ .

(2) Sketch the principal pattern for a uniform feeding **8 elements broadside circular array** with a radius of 4λ in the x-y plane where the elements are short dipoles oriented towards Z-axis.

b- **For the microstrip antenna:**

- i- Describe the structure, properties and applications.
- ii- Obtain an expression for the E and H plane patterns of a **uniformly illuminated microstrip antenna** where the E-field is in the Z- direction and the radiation is in X-direction.